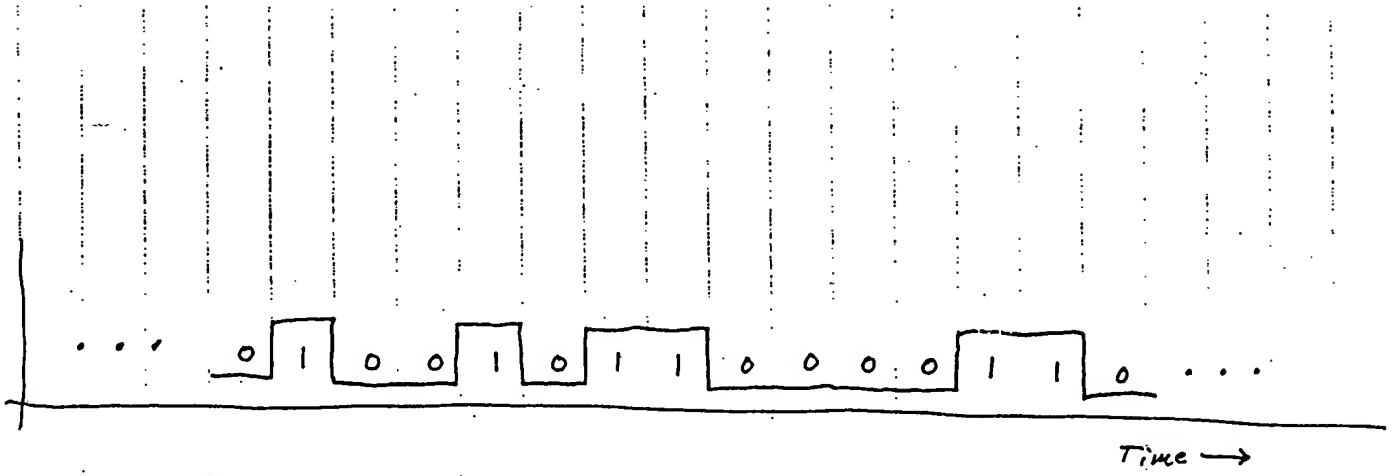


FIG. 1 (PRIOR ART)

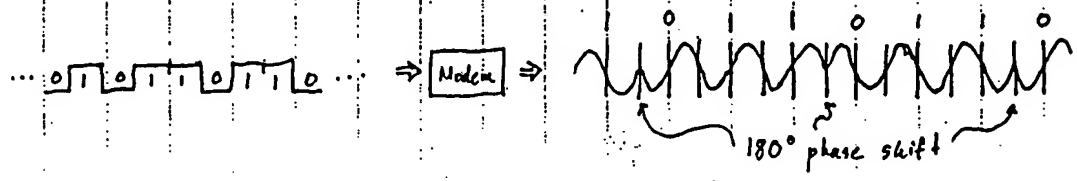


FIG. 2 (PRIOR ART)

7111-
02

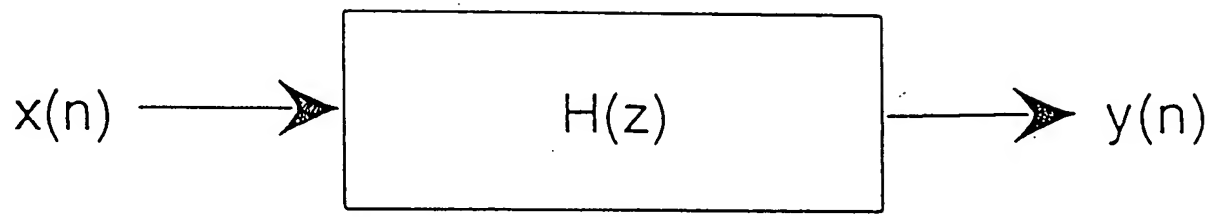


FIG. 3

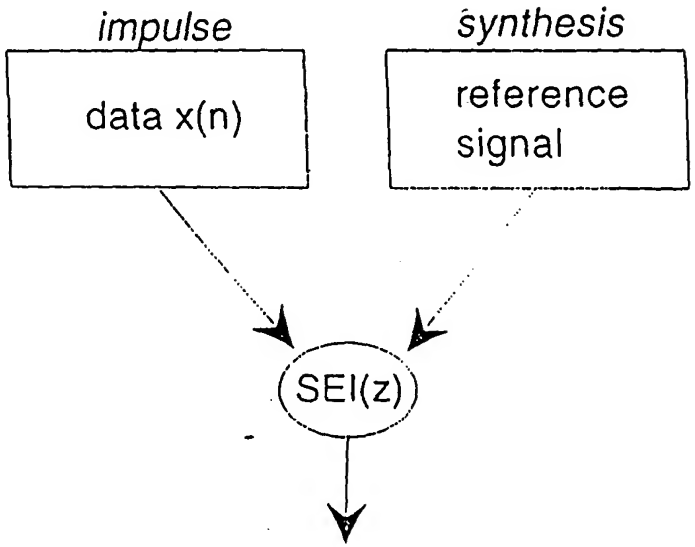
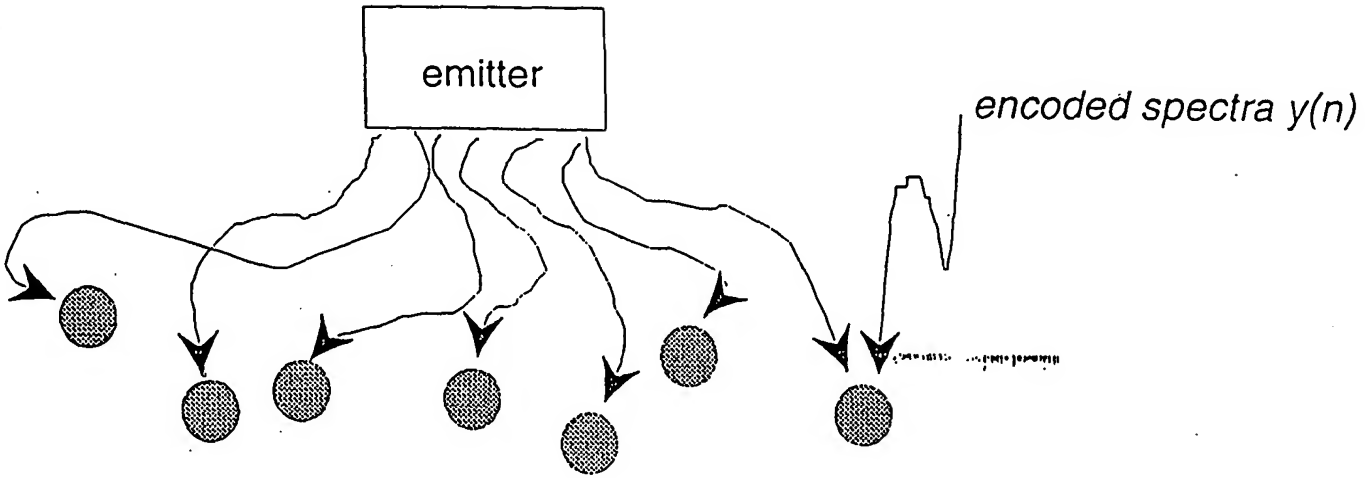


FIG. 4



A more detailed view of an SEI system. Encoded spectra are emitted over time, flowing forward in this direction →

Fig. 5

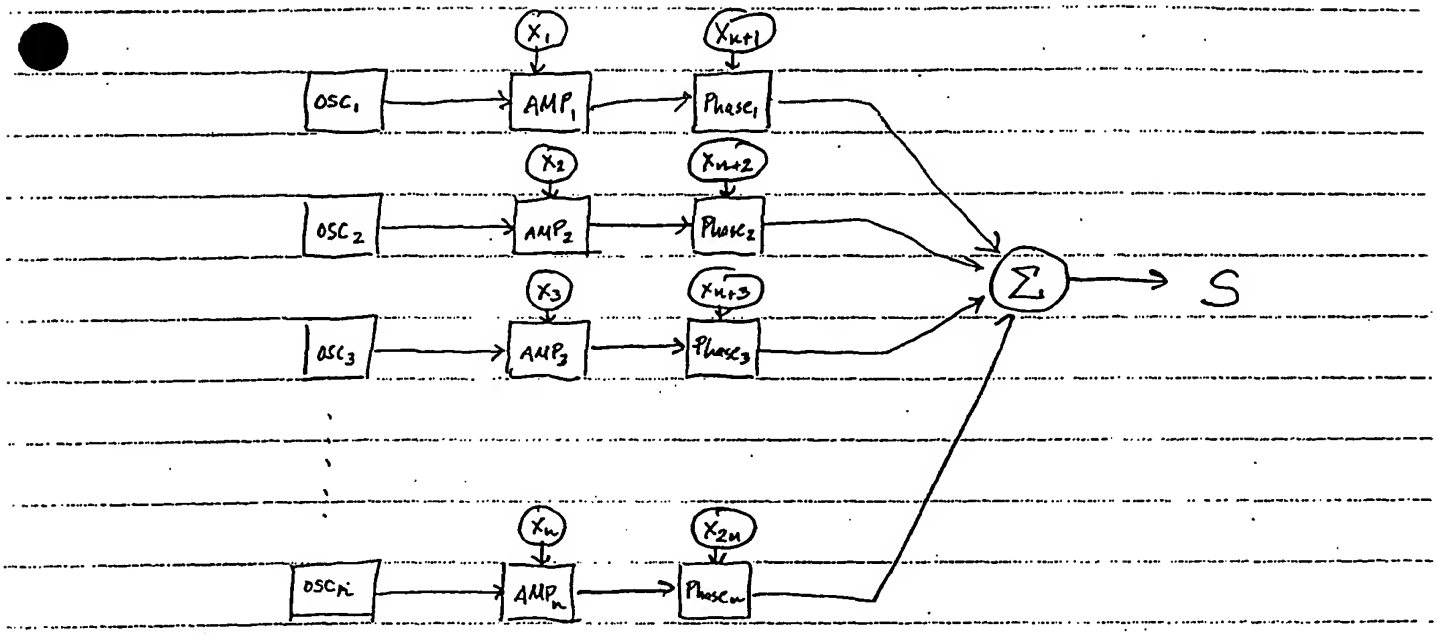

X_1
X_{n+1}
OSC_1
AMP_1
$Phase_1$
X_2
X_{n+2}
OSC_2
AMP_2
$Phase_2$
X_3
X_{n+3}
OSC_3
AMP_3
$Phase_3$
Σ
S
X_n
X_{2n}
OSC_n
AMP_n
$Phase_n$

FIG. 6

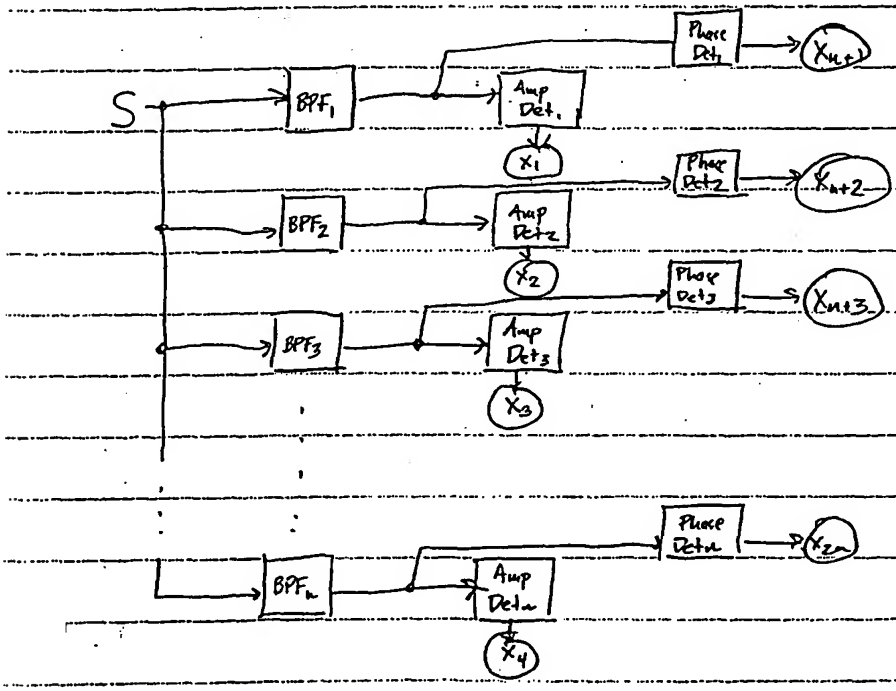

S
BPF_1
Amp Det.
Phase Det.
X_{n+1}
X_1
BPF_2
Amp Det.
Phase Det.
X_{n+2}
X_2
BPF_3
Amp Det.
Phase Det.
X_{n+3}
X_3
BPF_n
Amp Det.
Phase Det.
X_{2n}
X_4

FIG. 7

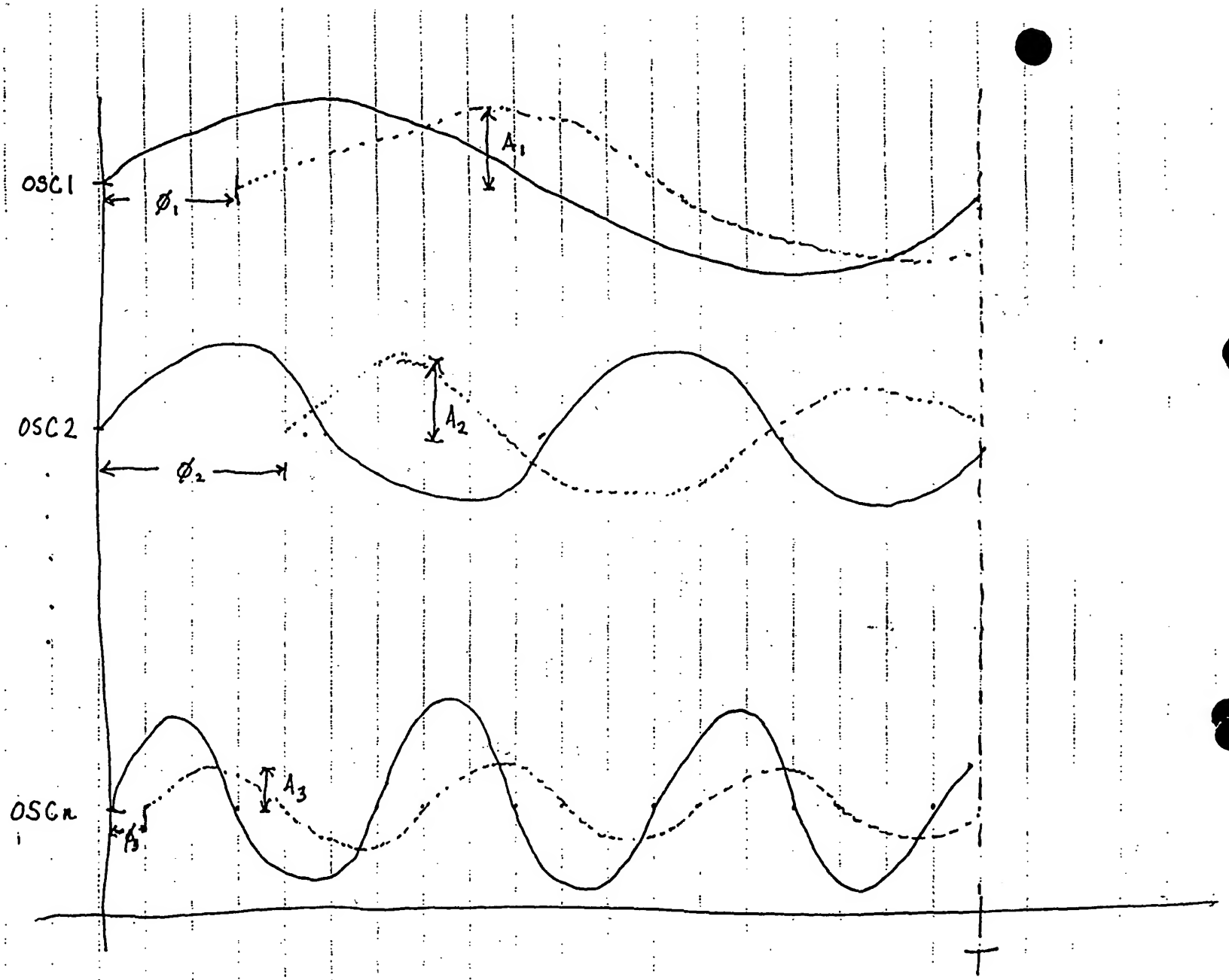


FIG. 8

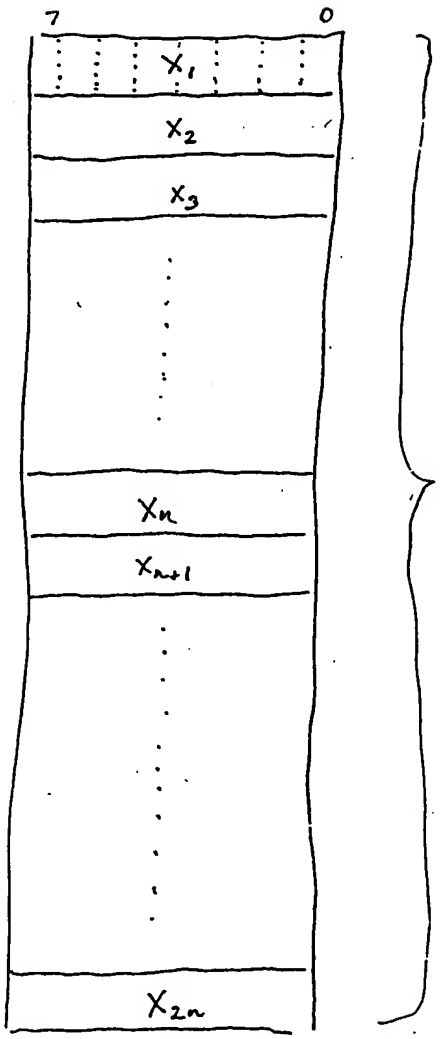
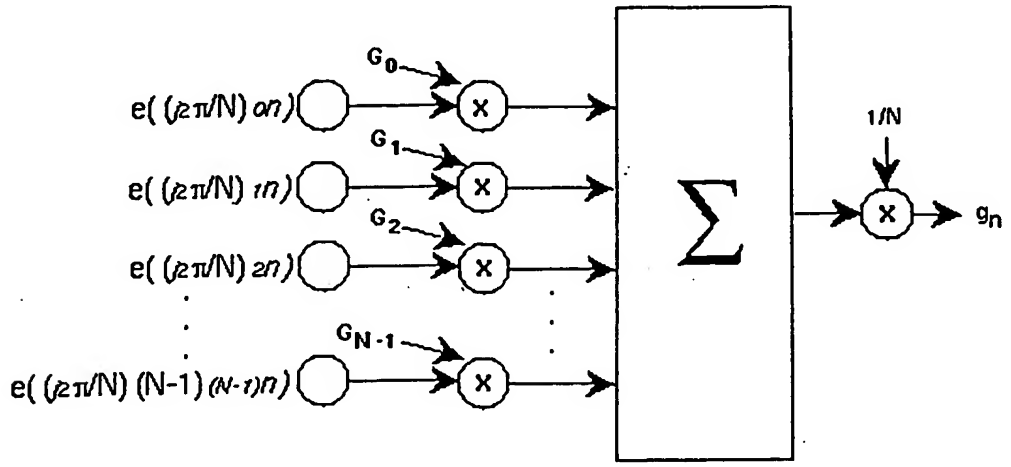
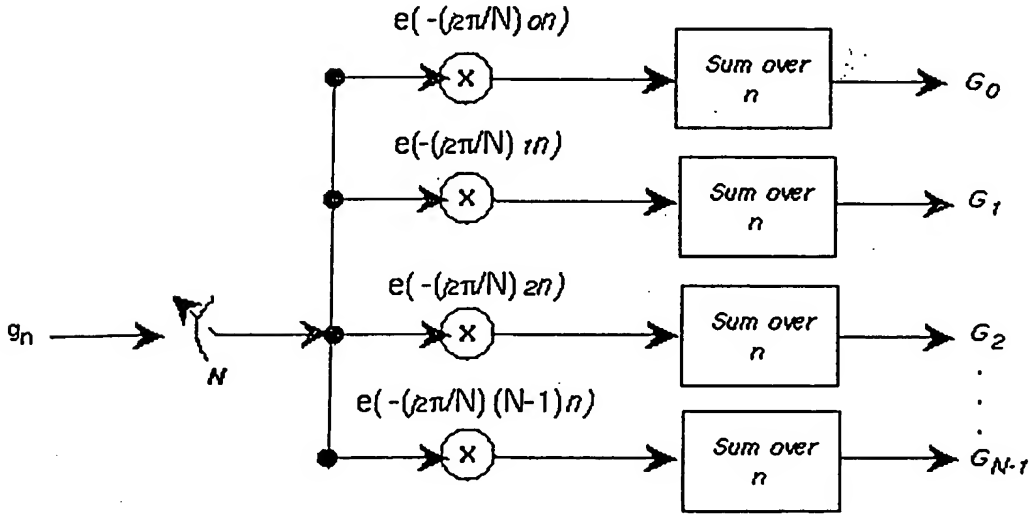


FIG. 9

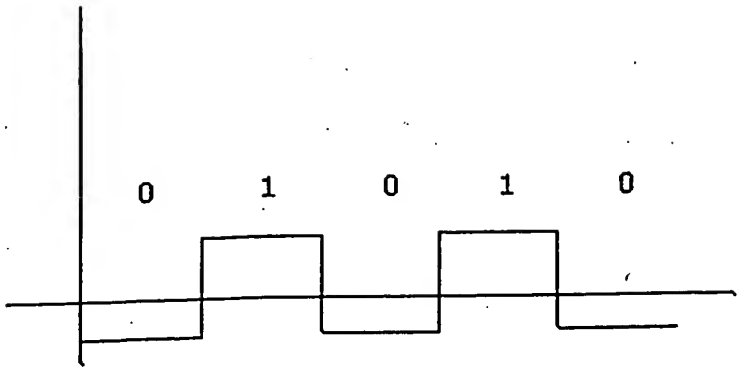


The Inverse Discrete Fourier Transform.



The Discrete Fourier Transform.

FIG. 10



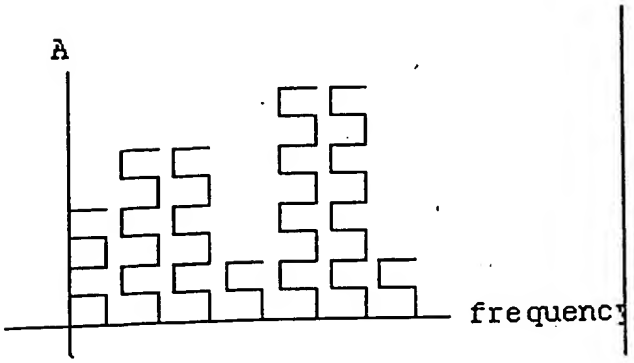


FIG. 11

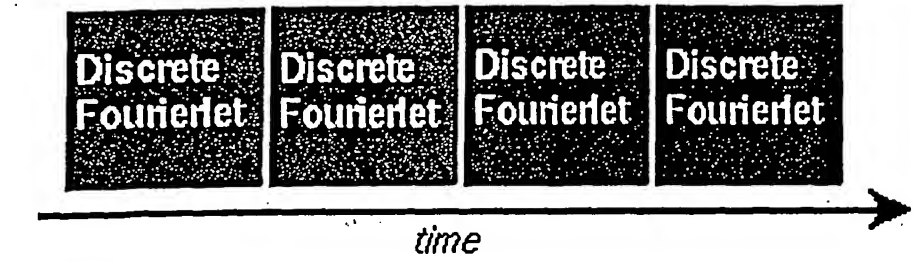

Discrete Fourierlet
Discrete Fourierlet
Discrete Fourierlet
Discrete Fourierlet
time

FIG. 12

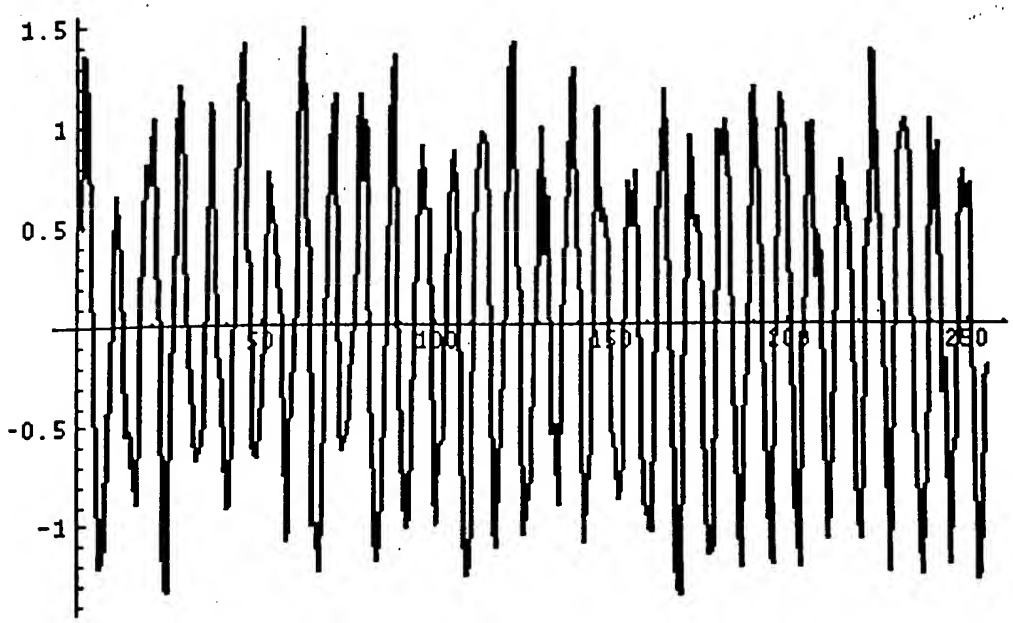


FIG. 13

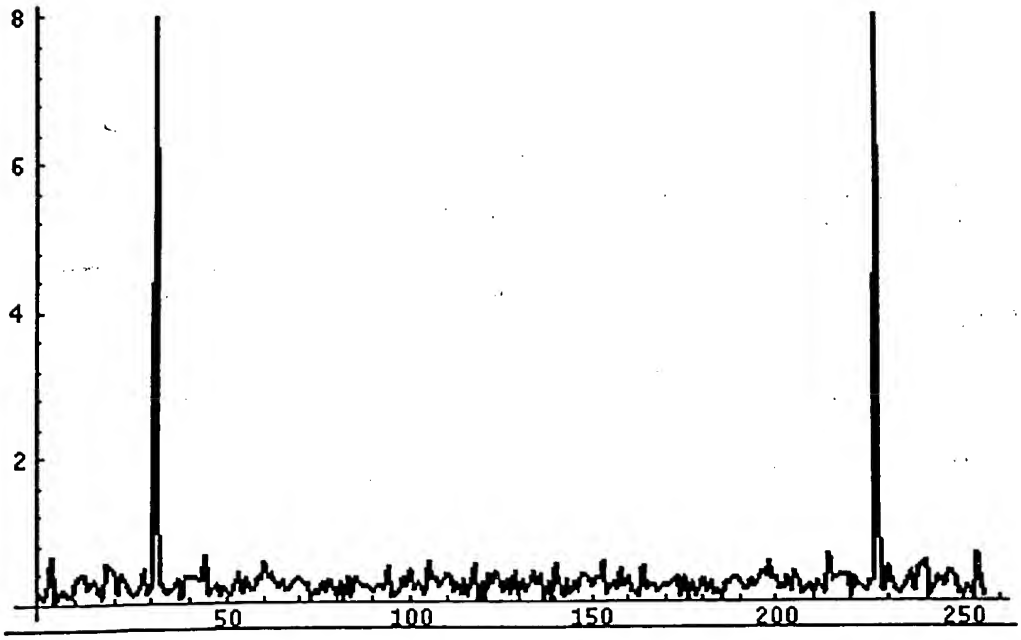


FIG. 14

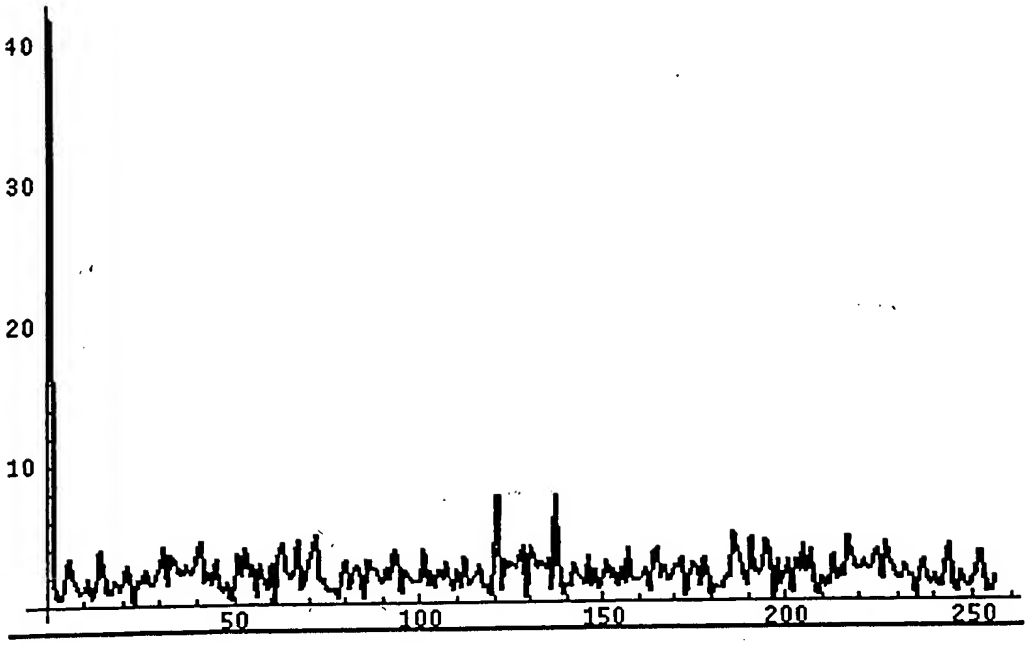


FIG. 15

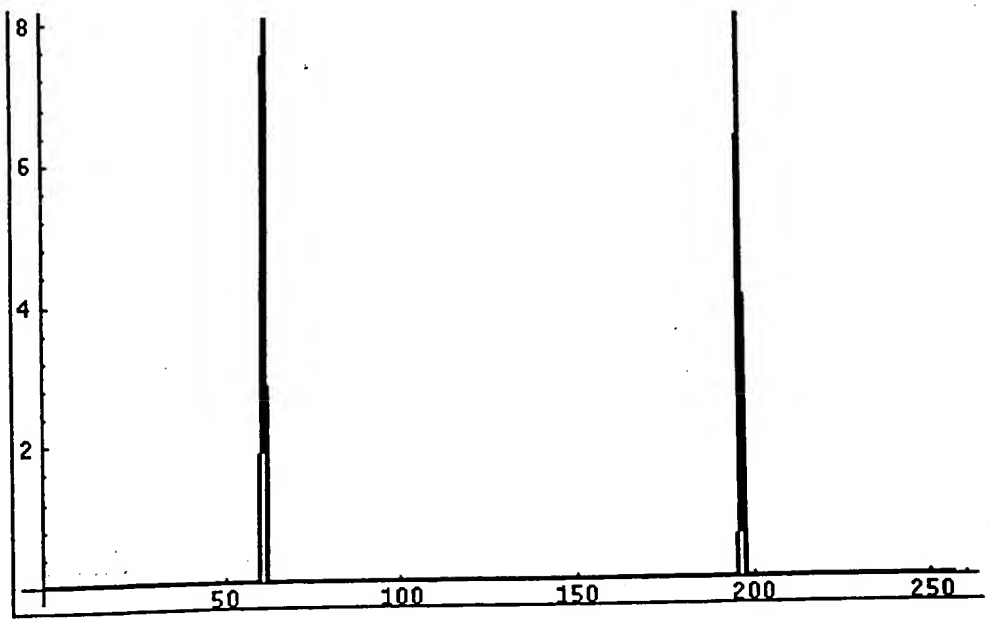
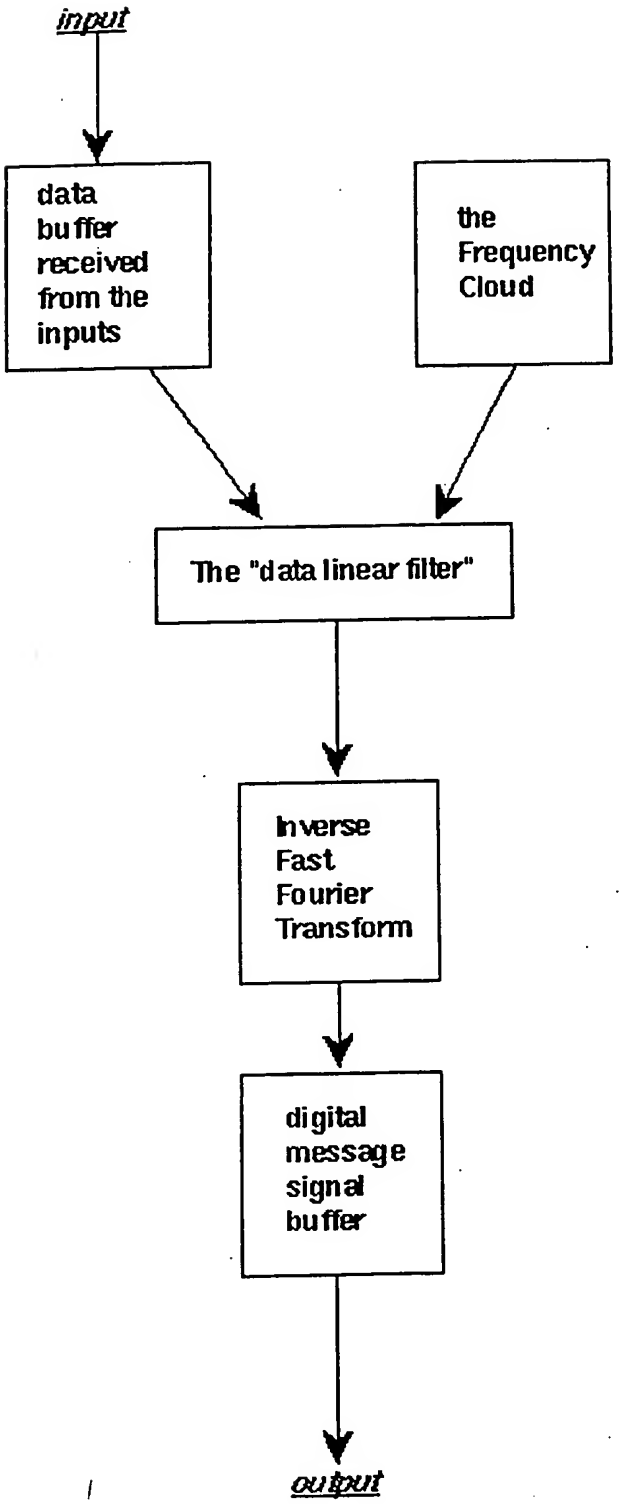
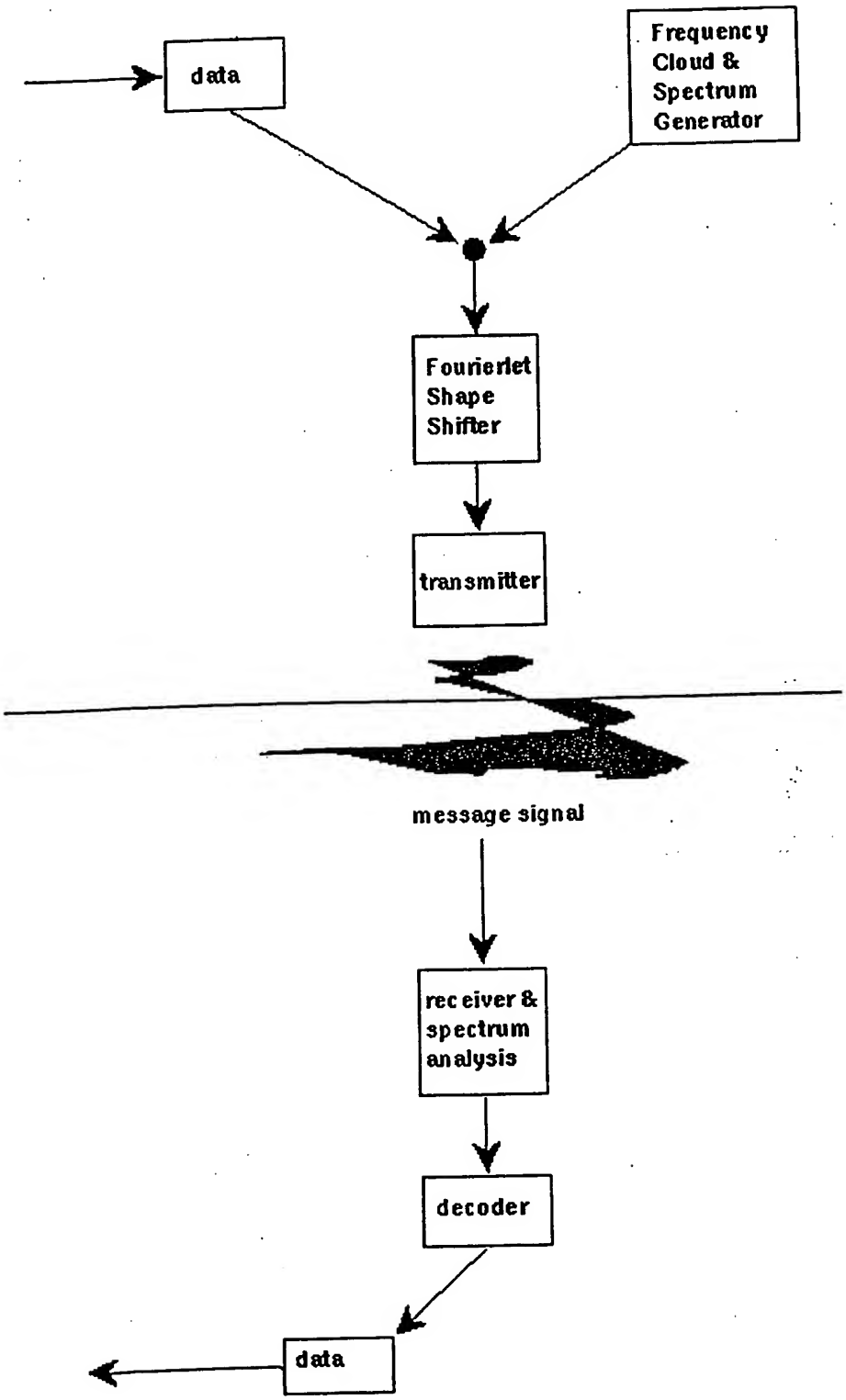


FIG. 16



The Fourierlet Shape Shifter.

FIG. 17



The Fourierlet Shape Shifter in system context.

FIG. 18

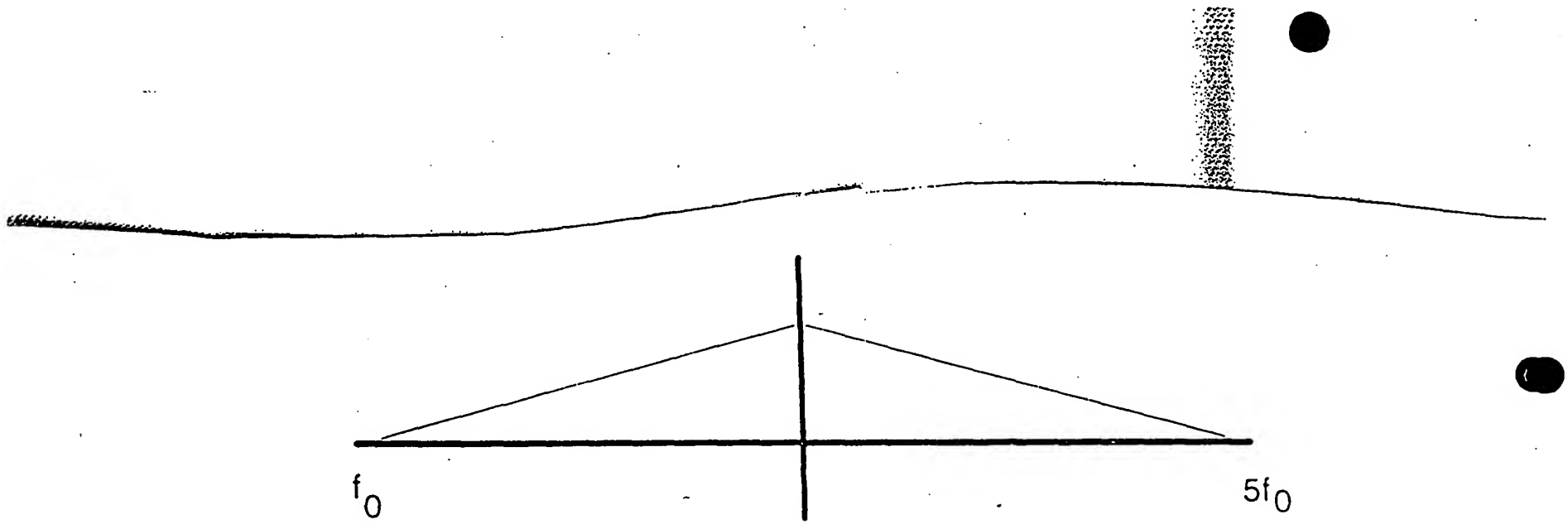


FIG. 19

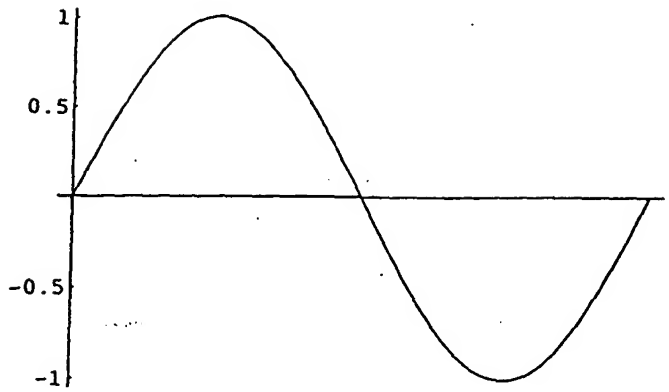


FIG. 20(a)

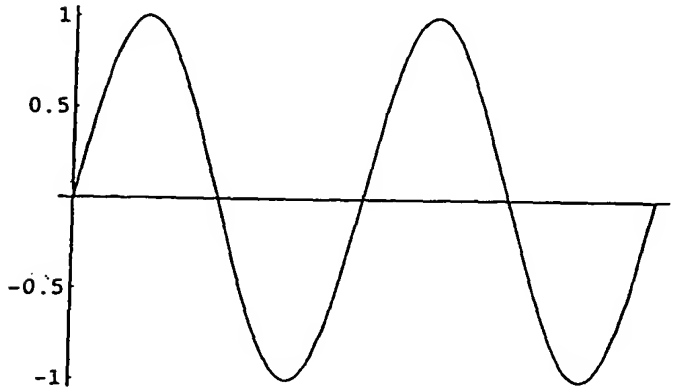


FIG. 20(b)

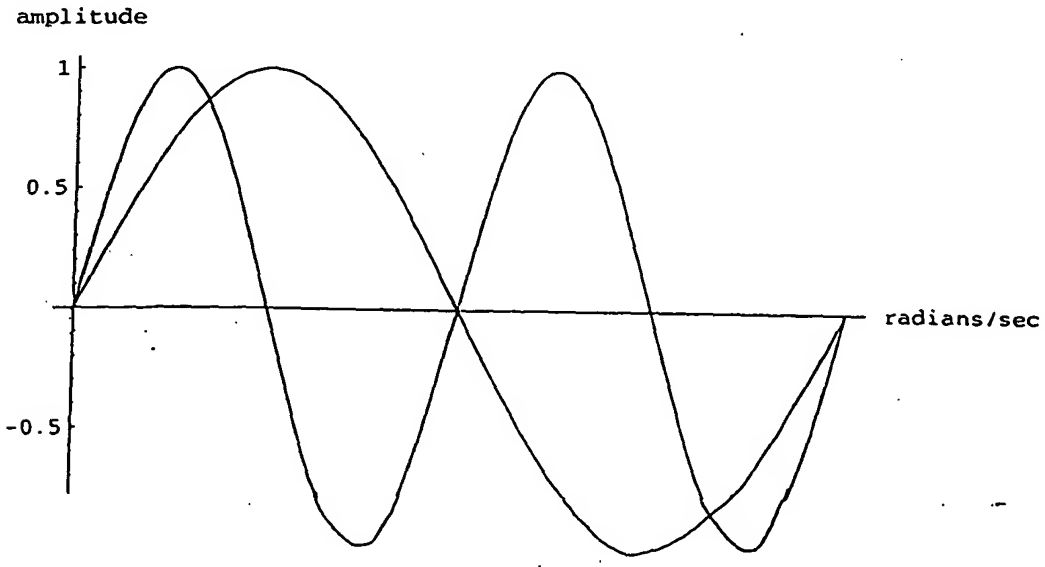


FIG. 20(c)

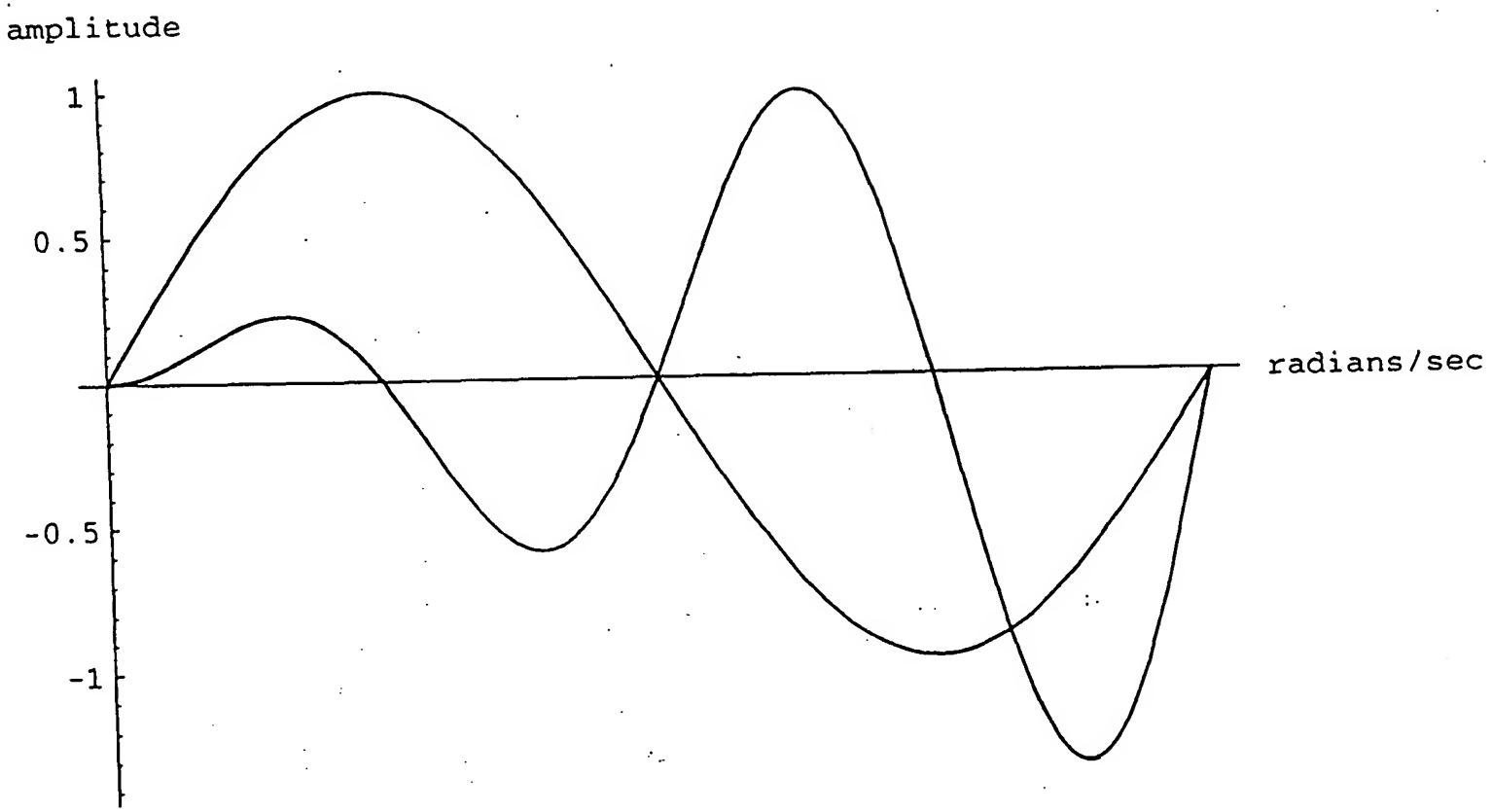


FIG. 21

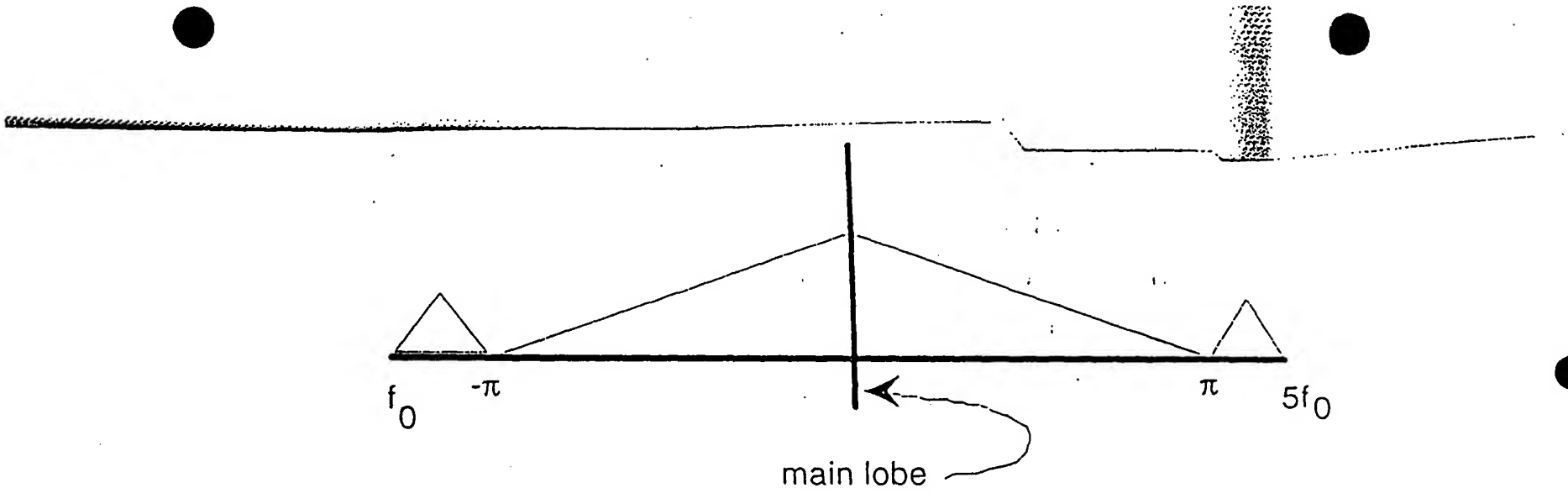


FIG. 22

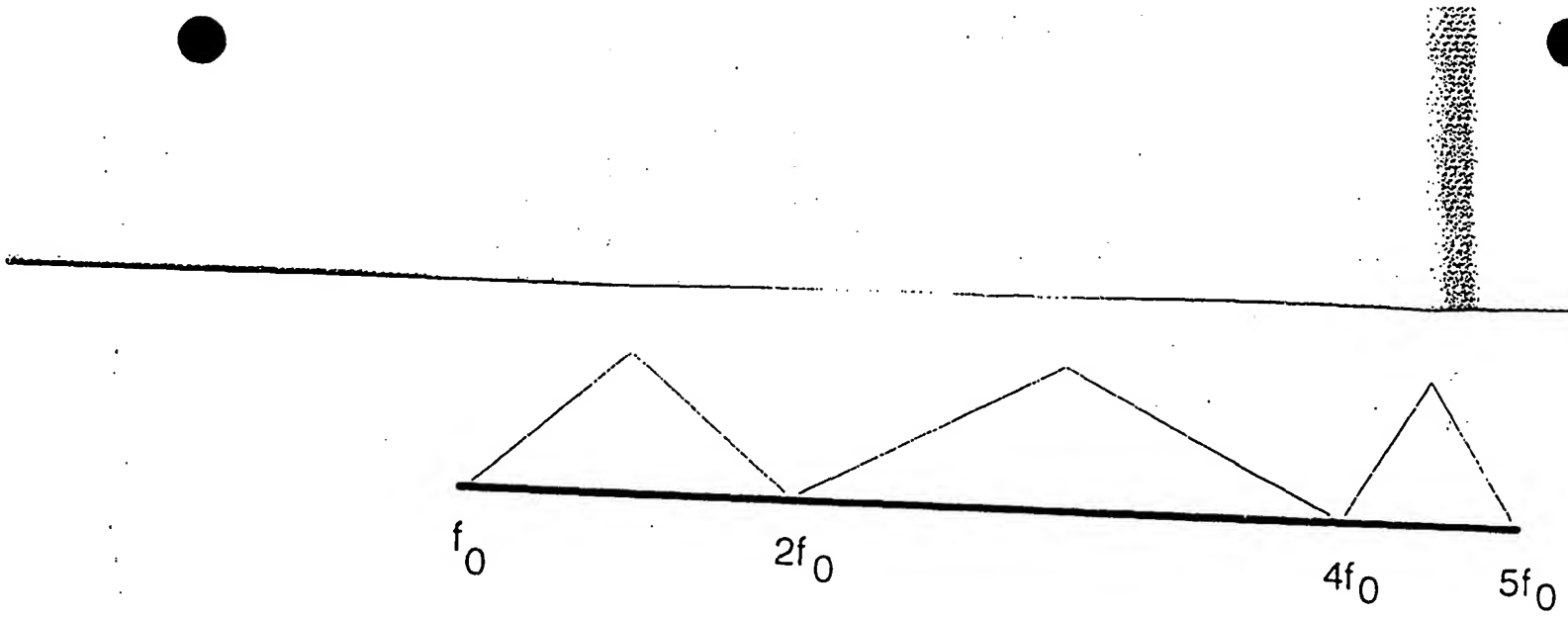


FIG. 23

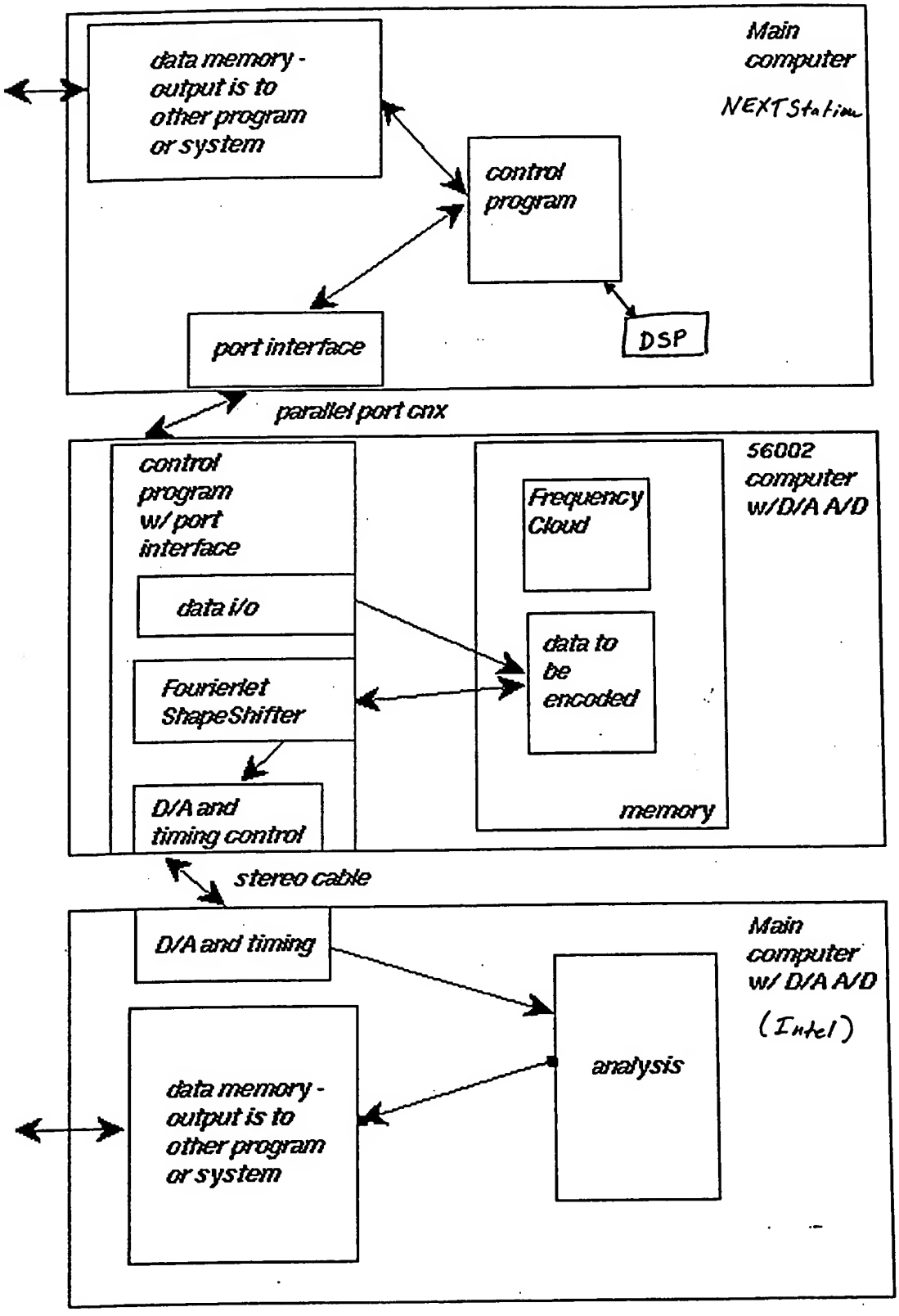

Main computer
NEXTStation
data memory - output is to other program or system
control program
DSP
port interface
parallel port cnx
control program w/ port interface
data i/o
Fourierlet ShapeShifter
D/A and timing control
56002 computer w/D/A A/D
Frequency Cloud
data to be encoded
memory
stereo cable
D/A and timing
Main computer w/ D/A A/D
(Intel)
analysis
data memory - output is to other program or system

FIG. 24

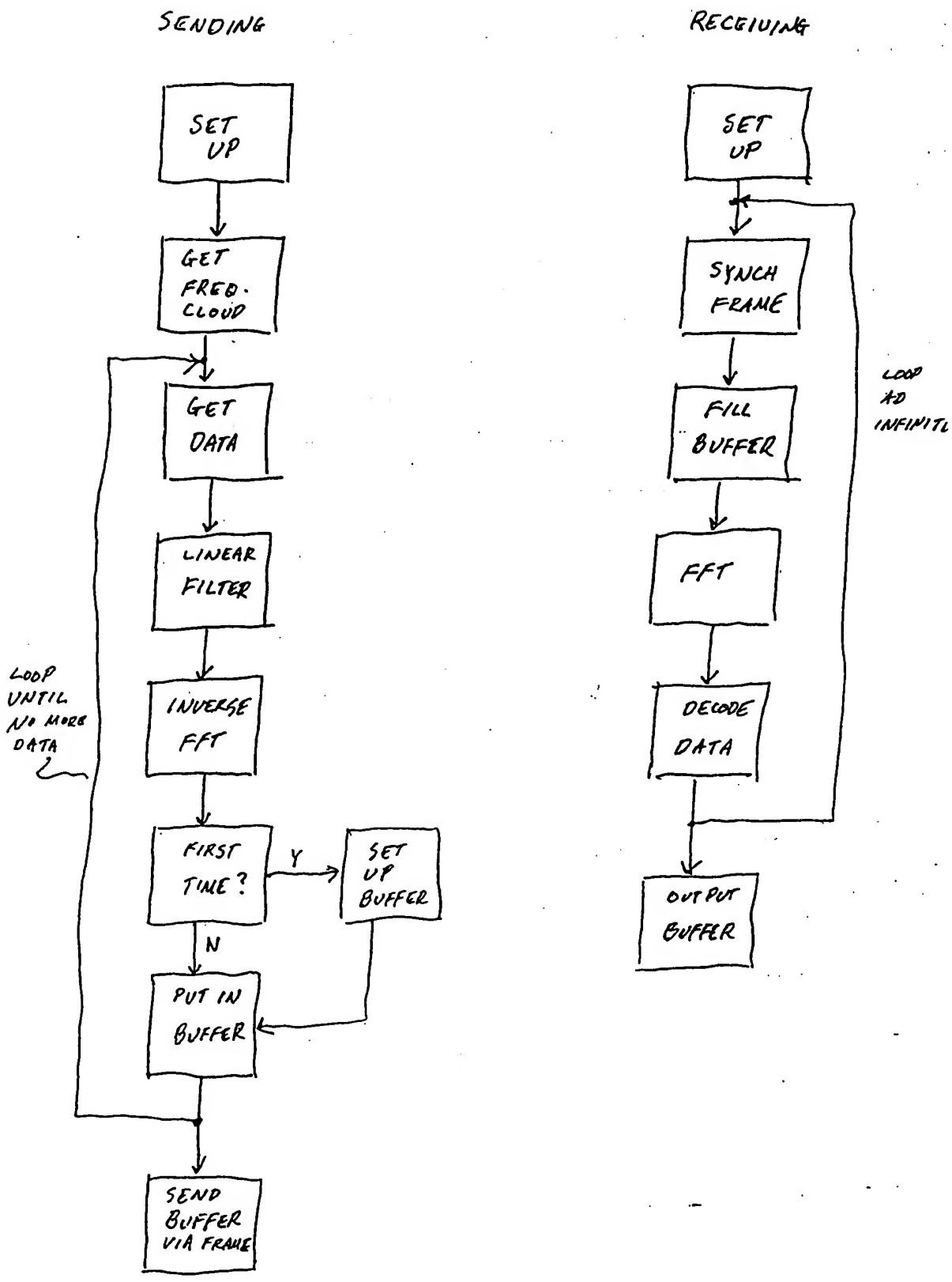

SENDING
SET UP
GET FREQ. CLOUD
GET DATA
LINEAR FILTER
INVERSE FFT
FIRST TIME?
Y
SET UP BUFFER
N
PUT IN BUFFER
SEND BUFFER VIA FRAME
LOOP UNTIL NO MORE DATA
RECEIVING
SET UP
SYNCH FRAME
FILL BUFFER
FFT
DECODE DATA
OUTPUT BUFFER
LOOP AD INFINITL

FIG. 25

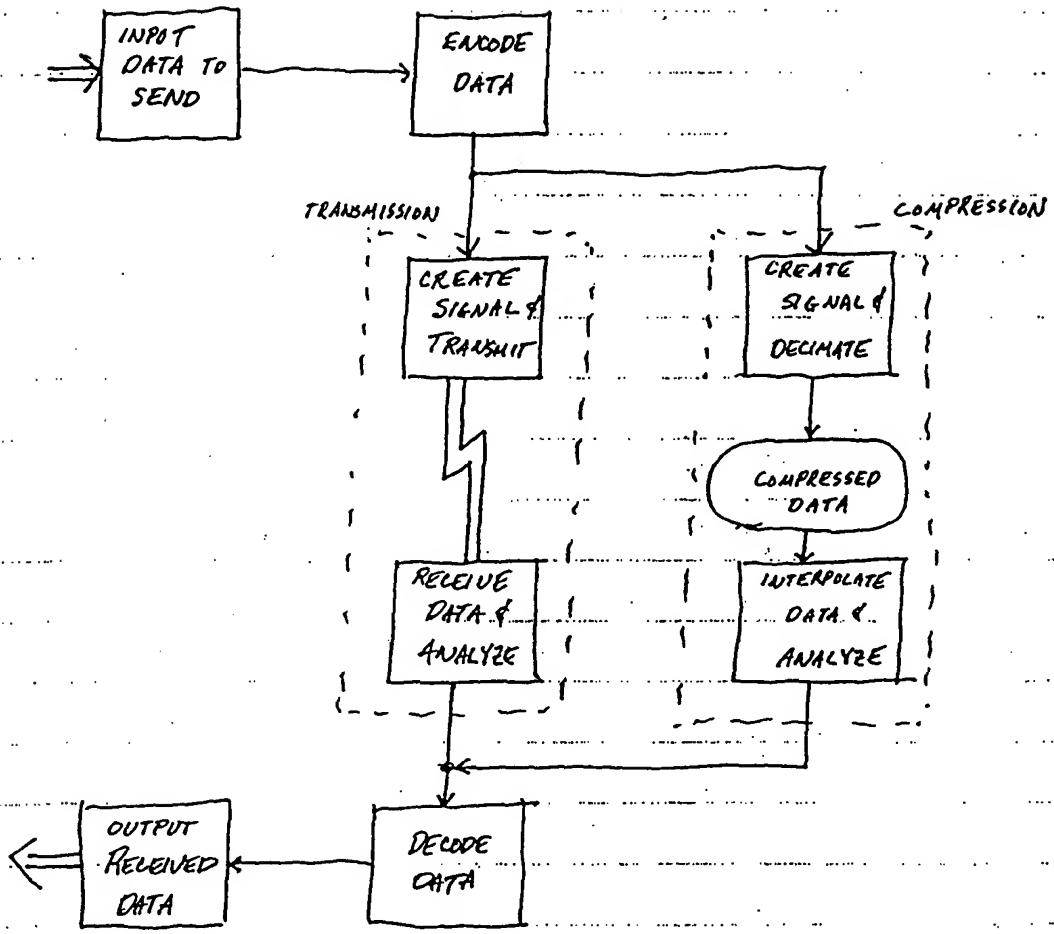

INPUT DATA TO SEND
ENCODE DATA
TRANSMISSION
COMPRESSION
CREATE SIGNAL & TRANSMIT
CREATE SIGNAL & DECIMATE
COMPRESSED DATA
RECEIVE DATA & ANALYZE
INTERPOLATE DATA & ANALYZE
DECODE DATA
OUTPUT RECEIVED DATA

FIG. 26

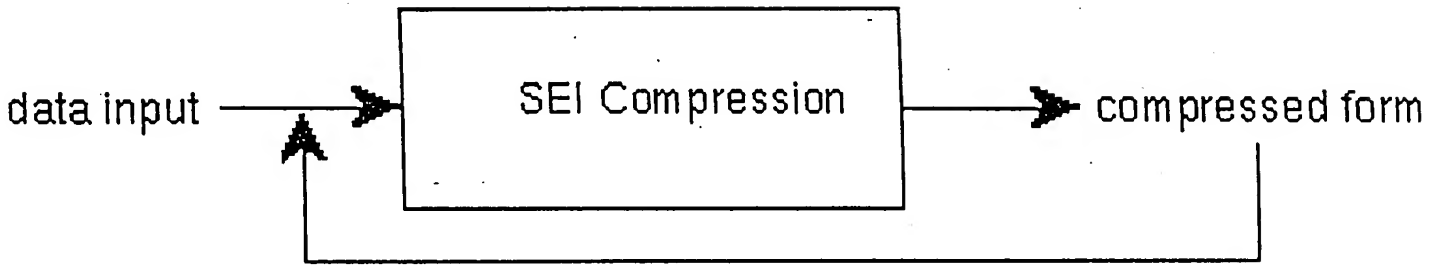


FIG. 27

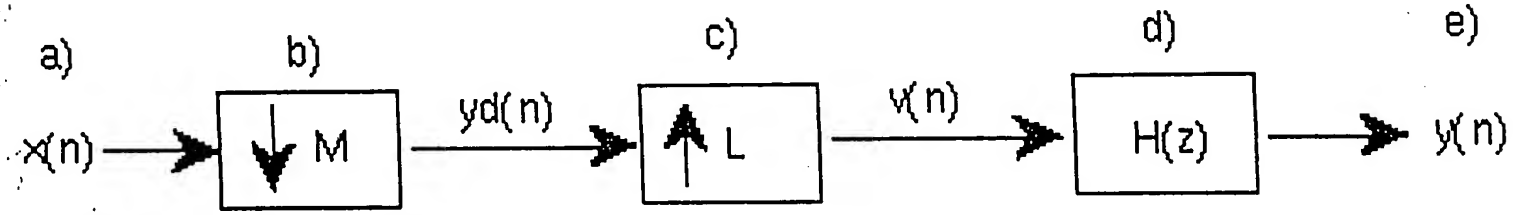


FIG. 28

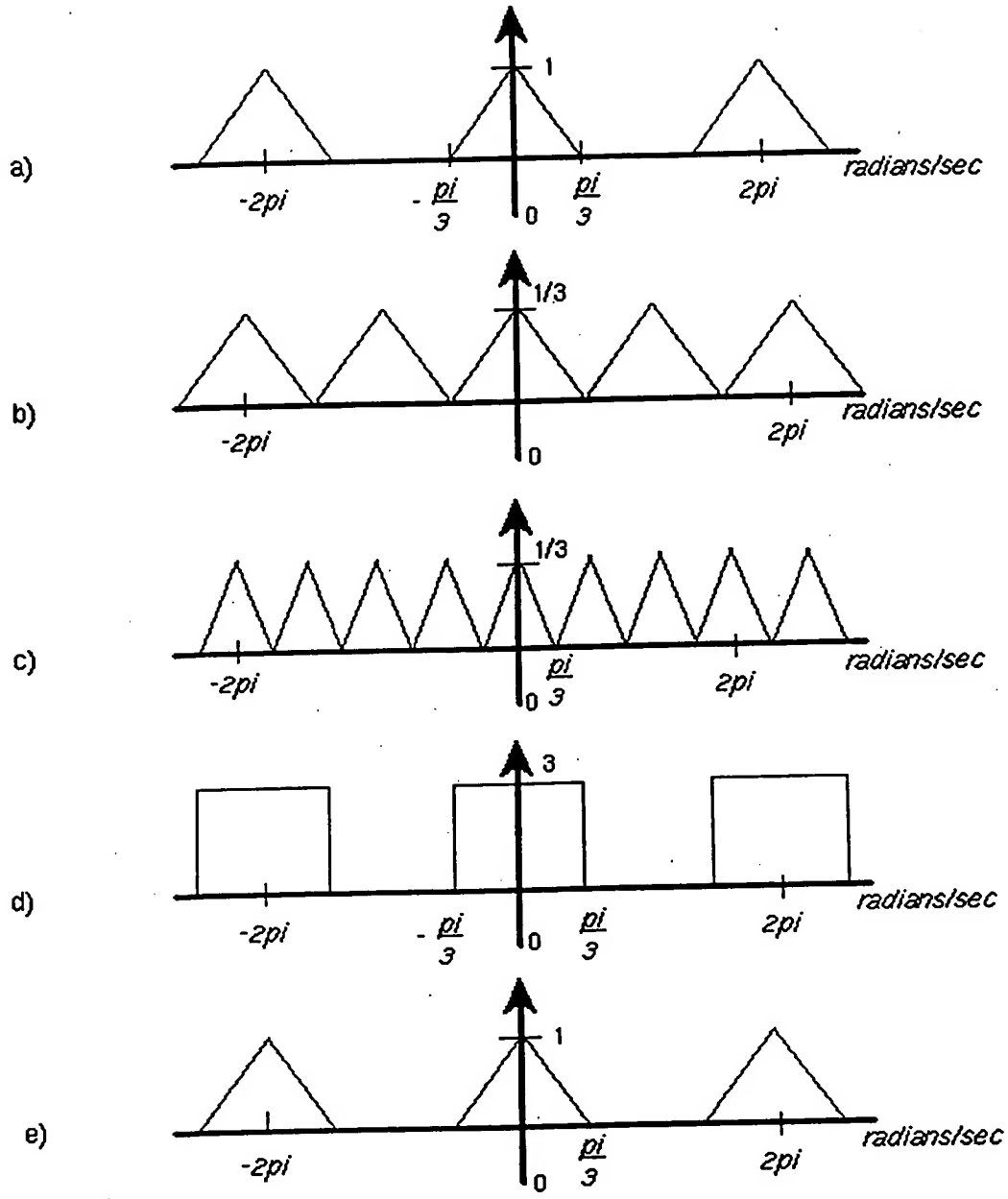

a)
1
-2pi
- pi/3
0
pi/3
2pi
radians/sec
b)
1/3
-2pi
0
2pi
radians/sec
c)
1/3
-2pi
pi/3
0
2pi
radians/sec
d)
3
-2pi
- pi/3
0
pi/3
2pi
radians/sec
e)
1
-2pi
pi/3
0
2pi
radians/sec

Fig. 29

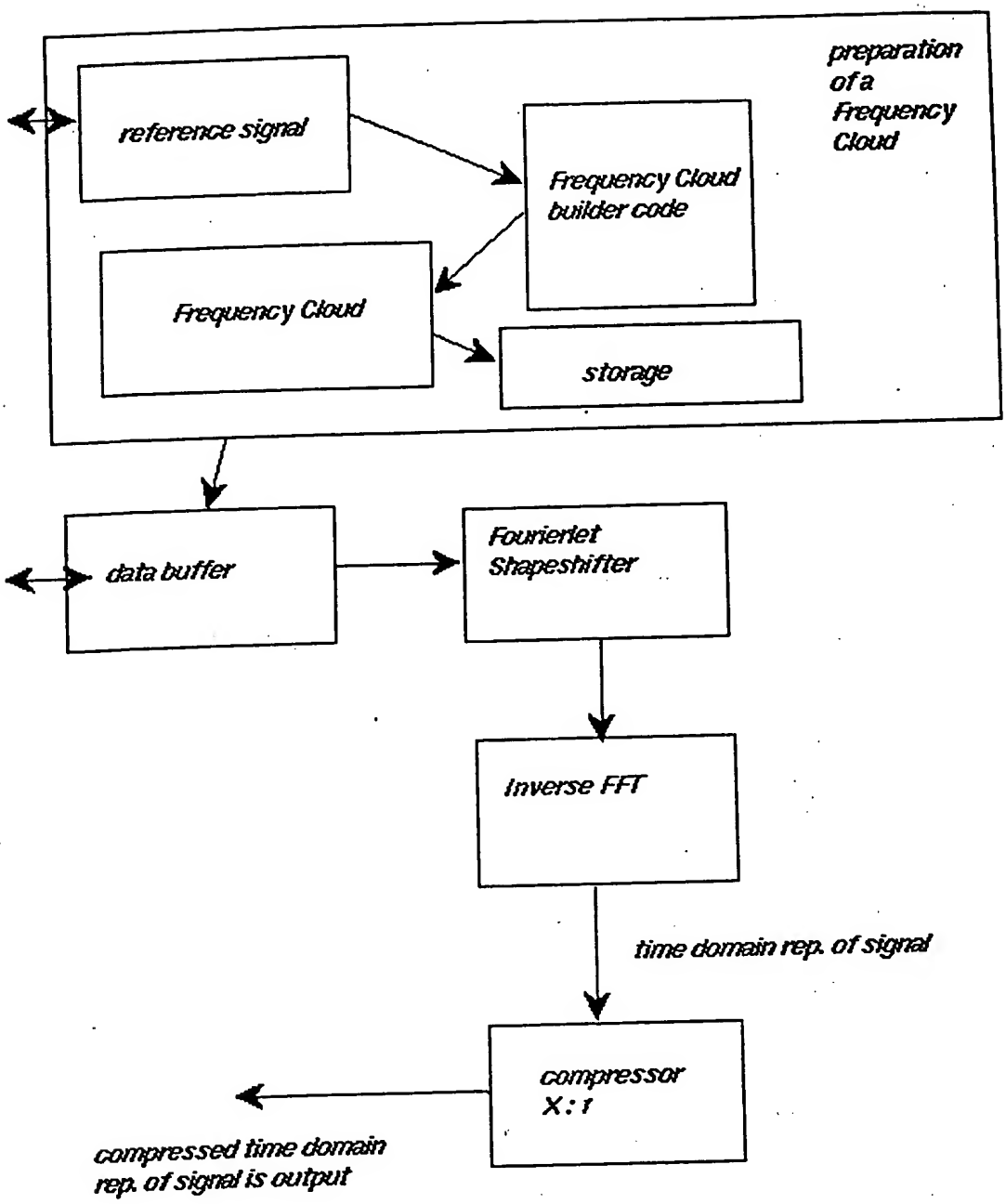

preparation of a Frequency Cloud
reference signal
Frequency Cloud builder code
Frequency Cloud
storage
data buffer
Fourierlet Shapeshifter
Inverse FFT
time domain rep. of signal
compressor X:1
compressed time domain rep. of signal is output

FIG. 30

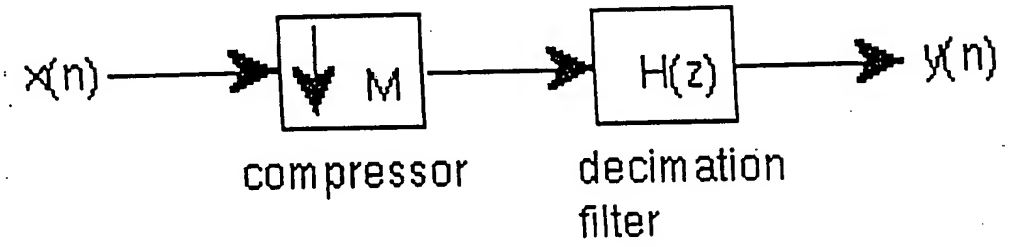


FIG. 31

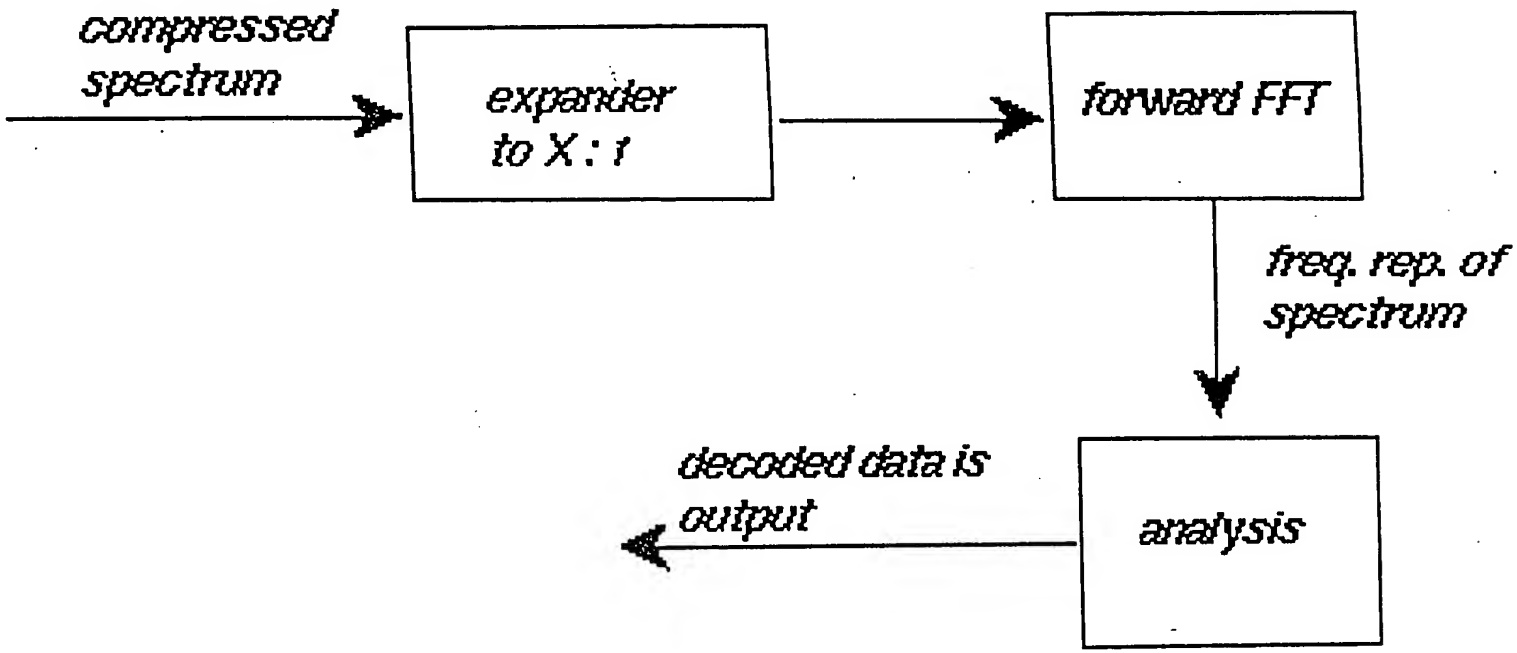

compressed spectrum
expander to X : 1
forward FFT
freq. rep. of spectrum
analysis
decoded data is output

FIG. 32

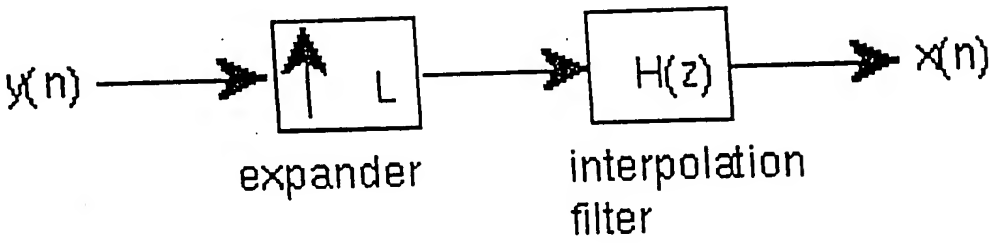


FIG. 33

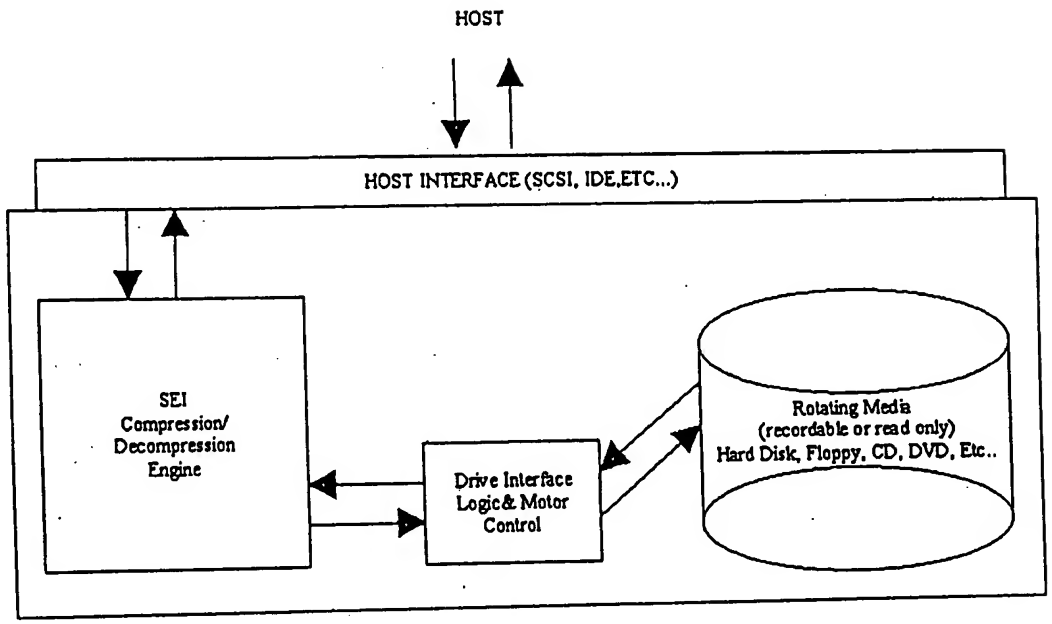

HOST
HOST INTERFACE (SCSI, IDE,ETC...)
SEI
Compression/
Decompression
Engine
Drive Interface
Logic& Motor
Control
Rotating Media
(recordable or read only)
Hard Disk, Floppy, CD, DVD, Etc..

FIG. 34

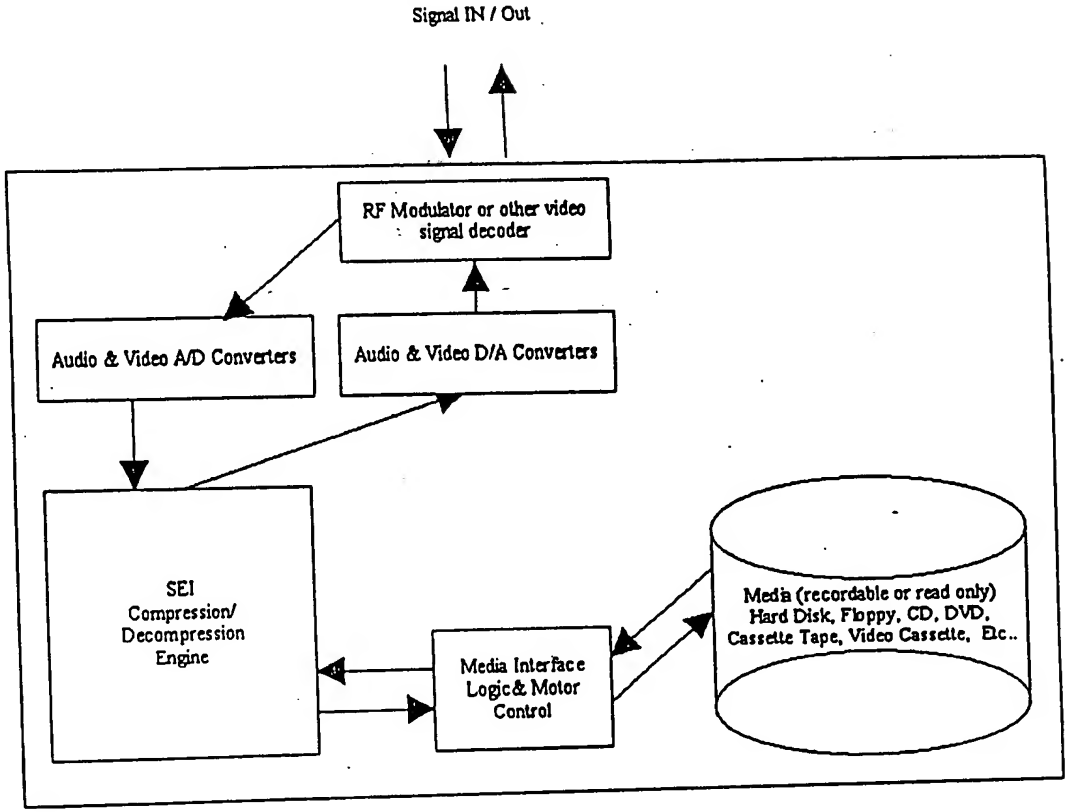

Signal IN / Out
RF Modulator or other video signal decoder
Audio & Video A/D Converters
Audio & Video D/A Converters
SEI Compression/ Decompression Engine
Media Interface Logic & Motor Control
Media (recordable or read only) Hard Disk, Floppy, CD, DVD, Cassette Tape, Video Cassette, Etc..

FIG. 35

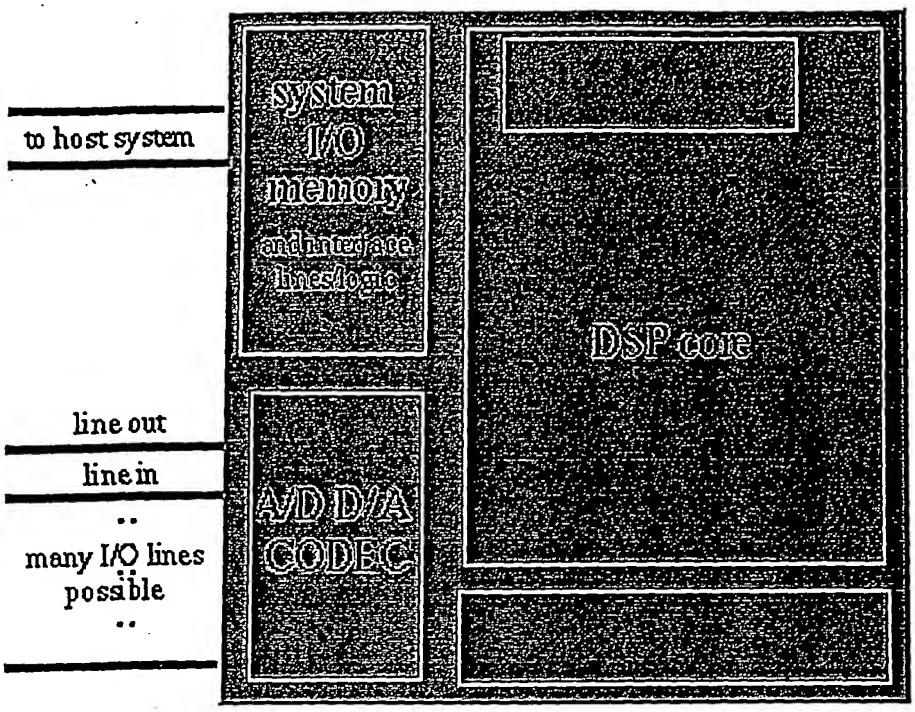

to host system
system I/O memory
and interface lines/logic
DSP core
line out
line in
many I/O lines possible
A/D D/A CODEC

FIG. 36

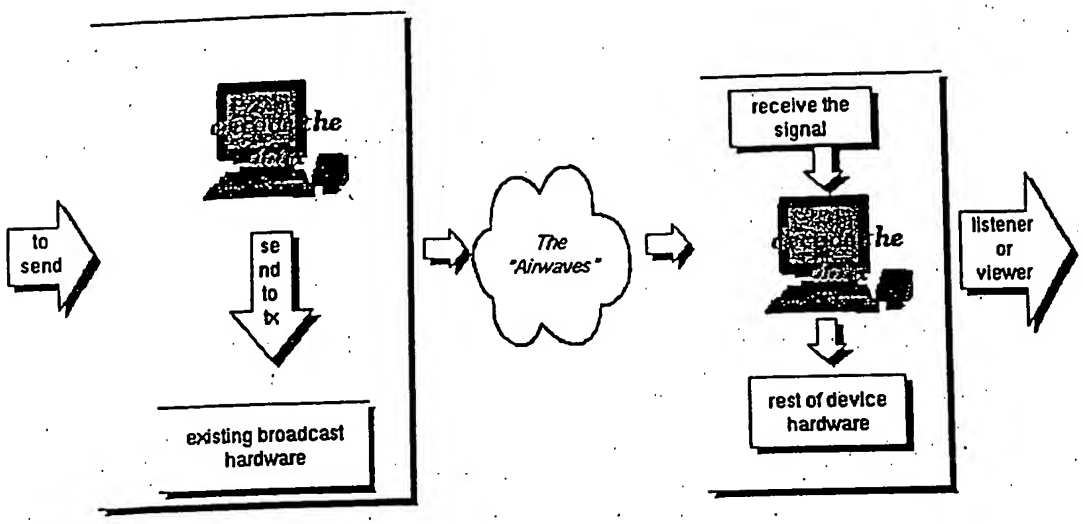

to send
se nd to tx
existing broadcast hardware
The "Airwaves"
receive the signal
rest of device hardware
listener or viewer

FIG. 37

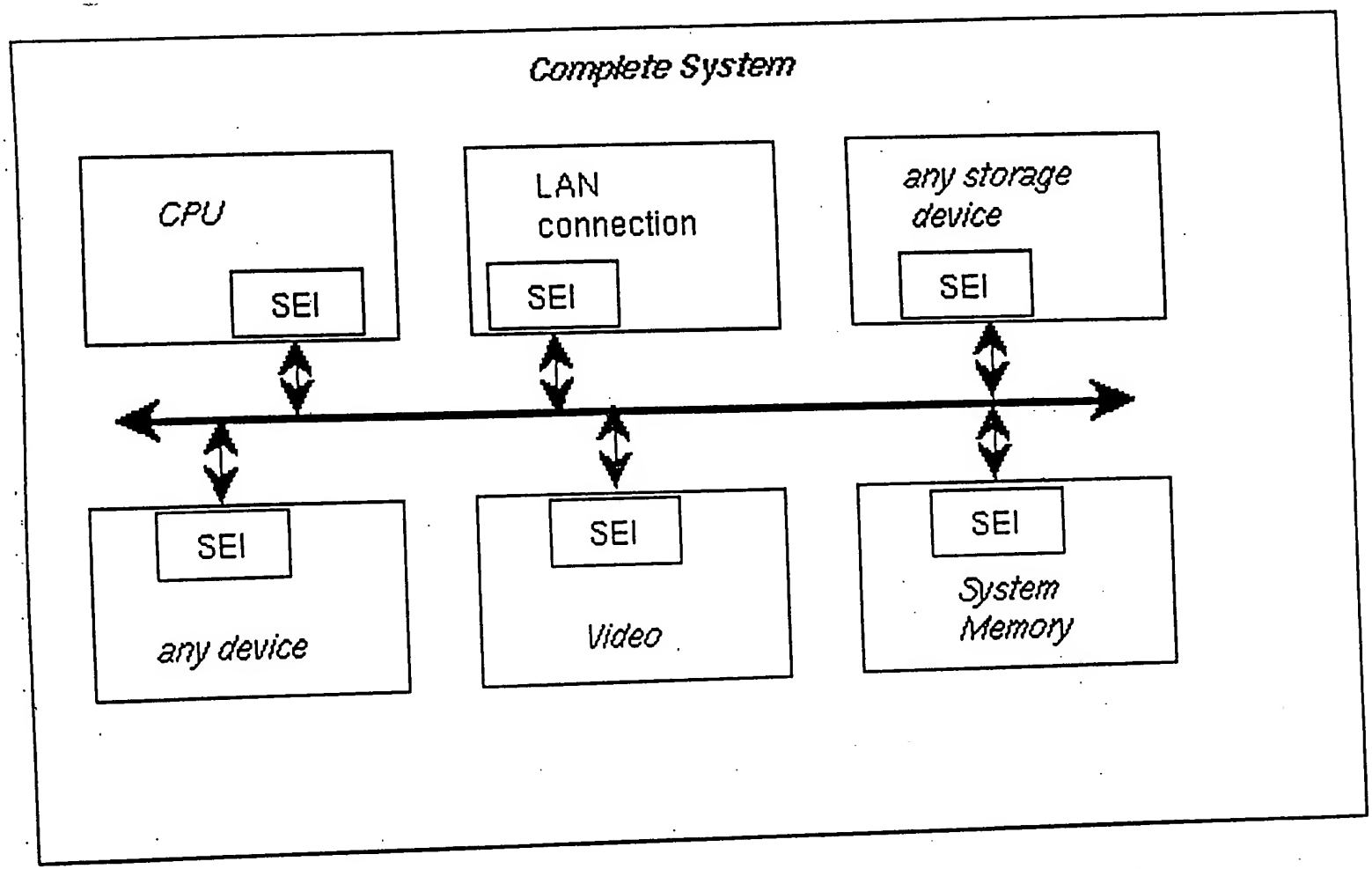

Complete System
CPU
SEI
LAN
connection
SEI
any storage
device
SEI
SEI
SEI
any device
SEI
Video
SEI
System
Memory

FIG. 38